Objectives

- Select an accredited lab
- Ensure lab results are accurate
- Maintain a "chain-of-custody"
- Evaluate lab results

Module 4: Selecting a Laboratory and Interpreting Results 1

Selecting a Laboratory

- Submit samples to an accredited lab recognized by EPA's:
  - ✔National Lead Laboratory Accreditation Program (NLLAP)
- Call National Lead Information Center (NLIC) Clearinghouse for a listing:
  - ✔1-800-424-LEAD

Module 4: Selecting a Laboratory and Interpreting Results 2

Questions to Ask Laboratories

- Recognized by NLLAP?
- Sample detection limit?
- Turnaround time for analysis?
- Cost per sample?
- Sampling materials?
- Supply spiked dust wipe samples?
- Perform calculations?
- Analyze composite samples?

Module 4: Selecting a Laboratory and Interpreting Results 3

Chain-of-Custody

- Documents each person who handles sample
- Ensures samples are not lost or tampered with
- Included on sampling form
- Your responsibility to maintain

Module 4: Selecting a Laboratory and Interpreting Results 4

Quality Control: How?

- Three steps:
  - ✔Accurately fill out the sample collection form
  - ✔Submit blank dust wipe samples
  - ✔Submit spiked dust wipe samples (recommended)

Module 4: Selecting a Laboratory and Interpreting Results 5

Quality Control: Why?

- Simple and cost effective
- Essential to legally document clearance test
- Ensures accuracy of results, sampling media, and sampling techniques

Module 4: Selecting a Laboratory and Interpreting Results 6

Completing Collection Form

- Confirm all information is recorded clearly and correctly
  - ✔Sample numbers
  - ✔Sample locations
  - ✔Sample dimensions

Module 4: Selecting a Laboratory and Interpreting Results 7

Blank Samples

- **What?** Unused wipes sent to the lab
- **Why?** Determine if sampling media are contaminated
- **When?** Submit one blank sample:
  - ✔For each unit tested
  - ✔From each wipe lot

Module 4: Selecting a Laboratory and Interpreting Results 8

Spiked Samples (Recommended)

- **What?** Wipe containing a known weight of lead-based paint dust
- **Why?** Check laboratory's analytic techniques
- **How?**
  - ✔Submit every 10 jobs

Module 4: Selecting a Laboratory and Interpreting Results 9

Evaluating Laboratory Results

- Step 1: Check for appropriate units - µg/ft^2
- Step 2: Do the math
- Step 3: Compare results to Federal guidance and standards for lead-contaminated dust

Module 4: Selecting a Laboratory and Interpreting Results 10

Common Mistakes

- Mistaking µg for µg/ft^2
- Not checking the laboratory's math
- Not submitting spike and blank samples
- Not maintaining a chain-of-custody

Module 4: Selecting a Laboratory and Interpreting Results 11

Summary: Now You Can

- Select an accredited lab
  - ✔Call 1-800-424-LEAD
- Ensure lab results are accurate
- Maintain a chain-of-custody
- Evaluate lab results
- Use Federal guidance / standards

Module 4: Selecting a Laboratory and Interpreting Results 12

Attachment 4-A: Questions to Ask Laboratory

♦ Is the laboratory recognized by NLLAP?	All samples must be analyzed by an NLLAP laboratory. You can contact the National Lead Information Center (NLIC) Clearinghouse at 1-800-424-LEAD for an up-to-date list of NLLAP-recognized laboratories. Even after selecting a laboratory, you should check the laboratory's accreditation every six months.
♦ What is the detection limit of the methodology used by the laboratory?	The detection limit is defined as the level below which the laboratory cannot report an accurate level of lead. For dust wipe sampling results to be accurate, the detection limit must be 10 $\mu g/ft^2$ or lower. It is important that the laboratory report its results in either micrograms (μg) or micrograms per square foot ($\mu g/ft^2$).
♦ What is the turnaround times for sample analysis?	Because the occupants often cannot occupy the units until sampling is complete, the laboratory turnaround time is important. Labs usually provide results within 1 to 3 days. A faster turn around time allows you to be more responsive to your client but may cost more money.
♦ What is the cost per sample?	You should be able to get your samples analyzed for under $7 to $15 per sample. However, prices can vary depending on how quickly you want the results. A 6-hour turn around will cost more than samples analyzed over a few days. You should also be wary that low laboratory costs that may be indicators of poor lab work.
♦ Will the laboratory provide sampling materials?	Many laboratories will provide you with all of the materials necessary to perform sampling. Sampling materials provided will likely include wipes, gloves, templates, tubes for submitting the samples to the laboratory, necessary sample collection forms, and overnight mailing envelopes. You may want to select a laboratory that provides these materials because laboratory-supplied materials and forms can help minimize potential errors in the analysis and record keeping.
♦ Does the laboratory supply spiked dust wipe samples?	In addition to the sampling materials, some laboratories will supply you with spiked dust wipe samples. Spikes are dust wipes contaminated by a laboratory with a known weight of lead-based paint dust, measured tot he nearest 0.1μg of lead dust. They are used to ensure adequate quality control of the digestion process at the laboratory. Although submitting spiked samples is optional, they are useful in determining if a laboratory reports back accurate results. If you decide to submit spiked samples, it is important that they are obtained from the laboratory so the sampling materials are consistent with the other wipes and to ensure the laboratory can accurately digest the wipe.
♦ Does the laboratory perform all the necessary mathematical calculations?	The Federal guidance is provided in $\mu g/ft^2$. Depending on the size of the sample or sample area, some mathematical calculations may need to be performed to convert the sample area to one square foot. Selecting a laboratory that will perform this calculation for you will save valuable time and reduce the possibility of mathematical errors. Note: even if a laboratory performs this calculation, it is still a good idea to spot check the math.

Attachment 4-B: Worksheet for Interpreting Spiked Dust Wipe Samples

When you get the results back from the laboratory, compare the spiked sample results to the known lead concentrations. For the laboratory results to be accurate, the measured sample loading must fall within 80 to 120 percent of the true value. Recording the spiked sample area as 1 ft^2 will facilitate this process.

You will need to perform four separate calculations to ensure that the spiked sample falls within 80 to 120 percent of the true value:

- Calculate the lead loading of the spiked sample;
- Calculate 80 percent of the true value – lower bound;
- Calculate 120 percent of the true value – upper bound; and
- Compare these numbers to the analysis results.

1. Write down the true lead loading contained in spiked sample (µg).	True value: _____ µg
2. Calculate the lower limit (80% of true value). Multiply the true value (from[1] above] by 0.8.	Lower limit: _____ µg × 0.80 = _____ µg
3. Calculate the high limit (120% of true value). Multiply the true value (from [1] above) by 1.20.	High limit: _____ µg × 1.20 = _____ µg
4. Write down the results you received from the laboratory analysis.	Laboratory results: _____ µg
5. Compare laboratory results with the low and high bounds for the analysis. Does the laboratory result fall between the lower and high limits?	Lower limit [2]: _____ µg Laboratory [4]: _____ µg High limit [3]: _____ µg

Does the spike pass or fail?

- **Pass:** laboratory results fall within 80 percent to 120 percent of the true value
- **Fail:** laboratory result do NOT fall within 80 and 120 percent of the true value
  - ➢ Submit another spike in your next shipment to the lab.
  - ➢ If this second spike also fails the laboratory results, all of the results must be considered invalid and you should consider finding a new laboratory to perform the analyses.

Attachment 4-C: Model of Laboratory Results

DUST SAMPLING RESULTS FORM

Date of clearance:	8/5/99
Clearance Technician:	Joe Smith
Client:	Sally Jones
Property address:	78 East Main St., Apt. A Hammond, IN 89898

Sample #	Location	Surface	Dimensions of sample area	Total μg Lead	μg/ft^2
98-1	Upstairs large bedroom	Floor	12 × 12	23	23
98-2	Upstairs large bedroom	Front facing int. window sill	24 × 3.0	10	20
98-3	Upstairs small bedroom	Floor	12 × 12	200	200
98-4	Upstairs small bedroom	Side facing int. window sill	24 × 3.0	29	58
98-5	Kitchen	Floor	12 × 12	12	12
98-6	Kitchen	Window above sink int. sill	24 × 3.0	211	422

Attachment 4-D: Worksheet for Performing Mathematical Conversions for Dust Samples

Unit of Measurement	Symbol	Unit of Weight	Symbol
Inches	in	Micrograms	μg
Square inches	in^2	Micrograms per square foot	$\mu g/ft^2$
Feet	ft		
Square feet	ft^2		

1. Convert the sample area to square feet (ft^2)

If the area you sampled was not a square foot, you will need to convert it to this dimension. One foot equals 12 inches, and one square foot equals 144 square inches.

- Record the sample area in inches (in) as opposed to feet (ft).
- Convert the sample area to square inches (in^2). If you have a decimal, round the number to three decimal places.
- Divide the square inches by 144 to get square feet (ft^2). If you have a decimal, round the number to three decimal places.

Dimensions of sample area in inches (in)	Length = _____ in Width: _____ in
Multiply length times width to calculate et the area in square inches (in^2)	_____ in × _____in = _____ in^2
Divide the area in square inches (in^2) by 144 to calculate the area in square feet (ft^2).	_____ in^2 ÷ 144 =_____ft^2

2. Convert the results to micrograms per square foot ($\mu g/ft^2$)

After you have converted the sample area to square feet, you need to find the amount of lead dust contained in that area. The micrograms per square foot ($\mu g/ft^2$) describes the quantity of lead dust contained in a one square foot area.

- Divide the lead concentration (μg) by the area (ft^2).

Dimensions of sample area in square feet (ft^2)	Area = _____ ft^2
Quantity of lead in micrograms (μg)	Lead = _____ μg
Divide micrograms (μg) by square feet (ft^2) to calculate micrograms per square foot ($\mu g/ft^2$)	_____ μg ÷_____ ft^2 = _____ $\mu g/ft^2$

Attachment 4-E: Activity – Interpreting Laboratory Results

- **Instructions:** The purpose of this activity is to test your ability to verify the results received from the laboratory, compare these results to the clearance guidance levels, and interpret the results. Using the following excerpt from a Dust Sampling Results Form, check the laboratory's calculation of the weighted lead-dust sample. (Note: the numbers used in this exercise have been simplified to facilitate calculations).

Sample #	Location	Surface	Dimensions of Sample Area (ft^2)	Total Lead (µg)	$µg/ft^2$
92-1	Upstairs bedroom	Floor	1.00	23	23
92-2	Upstairs bedroom	Interior window sill	0.5	150	300
92-3	Kitchen – front window	Interior window sill	0.5	260	130

1. Check the results (µg Lead/g) for each sample. If the results are incorrect, provide the correct results in µg Lead/ft^2.

2. After verifying the laboratory's results, compare these results to the appropriate clearance guidance. Did the individual samples pass or fail the clearance test?

EPA Guidance for Lead-Contaminated Dust
♦ Floors: 100 $µg/ft^2$
♦ Interior window sills: 500 $µg/ft^2$
♦ Window trough: 800 µg/ft2

92-1: Result: _____ Clearance Guidance: _____ Pass or Fail? _____

92-2: Result: _____ Clearance Guidance: _____ Pass or Fail? _____

92-3: Result: _____ Clearance Guidance: _____ Pass or Fail? _____